77TH CONGRESS } HOUSE OF REPRESENTATIVES { DOCUMENT
1st Session } { No. 180

PORT ALLEN HARBOR, T. H.

LETTER

FROM

THE SECRETARY OF WAR

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, UNITED STATES ARMY, DATED NOVEMBER 7, 1940, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND AN ILLUSTRATION, ON REEXAMINATION OF PORT ALLEN HARBOR, T. H., REQUESTED BY RESOLUTION OF THE COMMITTEE ON RIVERS AND HARBORS, HOUSE OF REPRESENTATIVES, ADOPTED MARCH 17, 1939

APRIL 21, 1941.—Referred to the Committee on Rivers and Harbors and ordered to be printed with an illustration

WAR DEPARTMENT,
Washington, April 15, 1941.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a report dated November 7, 1940, from the Chief of Engineers, United States Army, on reexamination of Port Allen, Hawaii, requested by resolution of the Committee on Rivers and Harbors, House of Representatives, adopted March 17, 1939, together with accompanying papers and illustration.

The Bureau of the Budget has been consulted and advises that authorization of the modified project recommended by the Corps of Engineers would not be in accord with the program of the President at this time.

Sincerely yours,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 7, 1940.

The CHAIRMAN, COMMITTEE ON RIVERS AND HARBORS,
House of Representatives, Washington, D. C.

MY DEAR MR. CHAIRMAN: 1. The Committee on Rivers and Harbors of the House of Representatives, by resolution adopted March 17, 1939, requested the Board of Engineers for Rivers and Harbors to review the reports on Port Allen, Hawaii, transmitted to Congress on January 5, 1937, with a view to determining whether any change in the recommendation made therein is advisable at the present time. I enclose the report of the Board in response thereto.

2. After full consideration of the reports secured from the district and division engineers, the Board recommends modification of the existing project for Port Allen Harbor, Hawaii, to provide for dredging an area at the northerly side of the existing project, 200 feet wide, 1,200 feet long, and 35 feet deep, substantially as shown on the accompanying map, at an estimated first cost of $75,000, with annual maintenance of $3,000 in addition to that now required.

3. After due consideration of these reports, I concur in the views and recommendations of the Board.

Very truly yours,

J. L. SCHLEY,
Major General,
Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

WAR DEPARTMENT,
THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., October 1, 1940.

Subject: Port Allen Harbor, Hawaii.
To: The Chief of Engineers, United States Army.

1. This report is in response to the following resolution adopted March 17, 1939:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors created under section 3 of the River and Harbor Act, approved June 13, 1902, be and is hereby, requested to review the reports on Port Allen, Hawaii, transmitted to Congress on January 5, 1937, with a view to determining whether any change in the recommendation made therein is advisable at the present time.

2. Port Allen Harbor is in Hanapepe Bay, on the south coast of the island of Kauai in the Hawaiian Islands. It is 115 miles northwest of Honolulu and 24 miles southwest of Nawiliwili Harbor. Hanapepe Bay is a coastal inlet 3,000 feet wide and 1,800 feet long. Depths increase gradually to 35 feet at the center of the entrance. The mean range of tide is 1.7 feet. The existing project provides for a rubble mound breakwater 1,200 feet long on the east side of the bay, for a dredged harbor basin 1,000 feet wide, 1,500 feet long and 35 feet deep, and for an entrance channel 500 feet wide and 35 feet deep. The project was completed in 1935 at a total cost of $880,000,

of which $200,000 was contributed by local interests. Total costs to the United States to June 30, 1939, have been $680,000 for new work and $12,243 for maintenance. The latest approved estimate of annual cost of maintenance is $15,000. Local interests have constructed a breakwater for protection of landings, and also a wharf, conveyors, and other terminal facilities at a reported cost of $901,000.

3. The area tributary to Port Allen is chiefly agricultural, the principal products being sugarcane, pineapples, rice, taro, and vegetables. The area is served by excellent hard-surfaced roads and narrow-gage railroads. Commerce of the harbor for the past 10 years has averaged 220,000 tons annually and consists principally of raw sugar, molasses, canned pineapples, fertilizer, and lumber. This is carried annually in about 100 trans-Pacific vessels drawing up to 31½ feet and 50 interisland vessels drawing up to 17½ feet.

4. Local interests request enlargement of the harbor on the northerly side, consideration of a silting basin north of the harbor, and consideration of groins to prevent formation of a sand bar across the mouth of the Hanapepe River. They claim enlargement of the harbor is necessary for safe navigation and suggest the need of an additional breakwater. No offer of further local cooperation is made.

5. The district engineer estimates the initial cost of dredging an area 1,200 feet long, 200 feet wide, and 35 feet deep along the northerly side of the harbor basin, as shown on the accompanying map, at $74,700, and added annual maintenance at $3,000. The monetary benefits are not susceptible of evaluation as the losses from damage to vessels maneuvering in the restricted area are impossible of prediction. However, the improvement will provide additional and much needed space for vessels in maneuvering in order to head out to sea and will eliminate the danger to craft and to the piers, which is now prevalent, especially during high winds. He believes that the construction of groins is not pertinent to the needs of navigation, that the benefits of a silting basin can be achieved more readily through maintenance dredging, and that the cost of the additional breakwater would be excessive and the benefits insufficient to justify the required expenditure. The district and division engineers concur in recommending only the dredging of the additional maneuvering area.

VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

6. The Board has carefully considered the reports and concurs in the view that enlargement of the harbor will produce benefits in the form of increased safety to general navigation sufficient to justify the necessary expenditure. The Board therefore recommends modification of the existing project for Port Allen Harbor, T. H., to provide for dredging an area at the northerly side of the existing project, 200 feet wide, 1,200 feet long, and 35 feet deep, substantially as shown on the accompanying map, at an estimated first cost of $75,000, with annual maintenance of $3,000 in addition to that now required.

For the Board:

THOMAS M. ROBINS,
Brigadier General, Corps of Engineers,
Senior Member.

SURVEY OF PORT ALLEN HARBOR, T. H.

SYLLABUS

Navigation within Port Allen Harbor subsequent to completion of the Territorial Pier in October 1939 indicates that the present width of about 1,000 feet available in the harbor basin dredged under the existing Federal project is inadequate for the safe maneuvering of vessels within the basin. The district engineer believes that further improvement of the harbor is warranted. He recommends that an additional area about 200 feet wide by about 1,200 feet long located at the northerly side of the present harbor basin be dredged to a depth of 35 feet at an estimated first cost of $74,700 and an annual cost for maintenance of $3,000, in addition to the present annual maintenance cost of $15,000.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Honolulu, T. H., May 17, 1940.

Subject: Report on survey of Port Allen Harbor, T. H.

To: The Chief of Engineers, United States Army. (Through the Division Engineer, South Pacific Division.)

1. *Authority.*—This report on a survey of Port Allen Harbor, Hawaii, is submitted pursuant to a resolution of the Committee on Rivers and Harbors, House of Representatives, adopted March 17, 1939. A preliminary examination reviewing earlier reports of the locality was made as required by law, and a report thereon was reviewed by the Board of Engineers for Rivers and Harbors. The Chief of Engineers authorized a survey, as recommended by the Board, to determine the advisability and cost of improvement and the local cooperation required.

2. *Description.*—Port Allen Harbor is located in Hanapepe Bay, on the south coast of the Island of Kauai, in longitude 159°36′ west and latitude 21°54′ north. It lies approximately 115 miles northwest of Honolulu, by water, and about 24 miles by improved road from Nawiliwili Harbor, which is located on the eastern coast of Kauai.

3. Hanapepe Bay, at the time of its initial improvement, was a coastal inlet approximately 3,000 feet wide extending inland a distance of about 1,800 feet, with a bottom sloping evenly to a depth of about 35 feet at the center of the entrance. The bottom of the bay was covered with an alluvial deposit, brought down over a long period of years by the Hanapepe River, which enters the bay on the north. Under this alluvial deposit lava rock occurs along the eastern and western portions and coral rock, in a considerable amount, in the west central portion.

4. Local interests constructed a rubble mound breakwater extending 230 feet westerly into the bay from the eastern point of land to provide protection to lighters and small boats. In 1935 the Federal Government completed improvements consisting of dredging the present harbor basin and construction of a rubble mound breakwater extending 1,200 feet southwesterly from the end of the privately constructed breakwater. The present harbor entrance is about 2,000 feet in width, with maximum depths of about 40 feet and a controlling depth of 35 feet over a minimum width of 600 feet. The present turning basin is about 1,200 feet wide by 1,500 feet long. The last survey of the harbor, made in March 1940, shows available depths of 35 feet mean lower low water, over most of the Federal project, but in areas in the northeast and southeast portions of the turning basin

totaling about 150,000 square feet shoaling has occurred so that there is an average depth in these areas of from 1 to 2 feet less than the project depth of 35 feet.

5. The tidal range between mean lower low water and mean higher high water is about 1.7 feet, and the extreme tidal range under ordinary conditions is about 2.7 feet. The harbor is subject to the action of southerly seas, which may occur during storms from any direction but are particularly severe during periods of southerly winds. The direction of the prevailing wind is from the east. Port Allen Harbor is shown on United States Coast and Geodetic Survey Chart No. 4108, and on the map accompanying this report. No bridges exist in the area under consideration.

6. *Tributary area.*—The island of Kauai possesses three harbors of commercial importance—Port Allen on the south, and Nawiliwili and Ahukini on the east. Highways and railways do not cross or completely encircle the island, and this condition, together with the wooded and mountainous nature of the central portions, divides the island into two commercial divisions. One division, embracing the eastern and northern portions of the island, is served by the ports of Ahukini and Nawiliwili. The other division, containing the southern and western portions of the island, is served by Port Allen Harbor.

7. Ahukini and Nawiliwili Harbors are 3 miles apart, located well to the south on the eastern coast. The port of Ahukini was privately developed, and from it is shipped virtually all the sugar produced in the eastern and northern portions of Kauai. Nawiliwili is a general freight and passenger port, developed jointly by the Federal and Territorial Governments, and is open to all shipping on an equal basis. The improvements made by the Federal Government at this port consist of a dredged harbor basin and a rubble mound breakwater, with a total cost to June 30, 1939, of $1,387,783.53.

8. The populated and arable area in the geographical division tributary to Port Allen Harbor is contained in a coastal belt along the south and west shores, approximately 30 miles in length and from 1 to 5 miles in width. It extends from the Hoary Head Mountains on the east to the end of railway and highway communications on the west. Port Allen is centrally located within this coastal area.

9. Agriculture constitutes the chief industry in the area tributary to Port Allen Harbor. Six plantations, cultivating practically all the land in southern and western Kauai which is suitable for the growing of sugarcane, produce annually about 110,000 tons of raw sugar and 35,000 tons of molasses, for shipment through Port Allen Harbor to continental United States. At Lawai, located approximately 7 miles northeast of Port Allen, the Kauai Pineapple Co. operates a pineapple cannery with an annual output of about 12,000 tons, obtaining the fruit from its own fields and from independent growers. Numerous small farms in the area produce small quantities of rice, taro, and vegetables, mostly for local consumption.

10. Six principal towns exist within this area, with populations in the 1930 census as follows: Waimea, 2,091; Koloa, 1,844; Hanapepe, 1,088; Makaweli, 974; Kehaha, 900 (estimated), and Mana, 500 (estimated). Five smaller towns and many plantation camps housing plantation workers are also located within the area. In the immediate vicinity of Port Allen Harbor are the towns of Hanapepe, located on the Hanapepe River a short distance above its mouth, and

Eleele, with a population of about 400, located immediately northeast of the harbor.

11. Hard-surfaced highways with many branches and laterals traverse the area, and connect to the eastern and northern portions of the island through the town of Lihue, the county seat. Narrow-gage railroads, owned and operated by the several sugar companies, extend throughout the entire tributary area and connect to the eastern portions of the island.

12. *Prior reports.*—In addition to the report on reexamination prepared under the present authority, one prior report pertaining to Port Allen Harbor has been submitted during the past 5 years, it being a report on preliminary examination submitted to the division engineer under date of March 10, 1936. At that time local interests requested the construction of an additional breakwater, to be located at the west side of the entrance channel, and enlargement of the turning basin on its northwesterly side by dredging to a depth of 35 feet over an additional width of 300 feet. The district engineer found that full utilization of the Federal project was impracticable at that time, owing to the failure of local interests to provide the necessary terminal facilities, and that the need for the improvements requested could not be definitely established. He recommended that no survey be authorized at that time, and in this recommendation, the division engineer, the Chief of Engineers, and Board of Engineers for Rivers and Harbors all concurred.

13. *Existing project.*—The existing project was authorized by the Public Works Administration on September 6, 1933, and adopted by the River and Harbor Act of August 30, 1935. It provides for a rubble mound breakwater about 1,200 feet long on the east side of Hanapepe Bay, for the dredging of a harbor basin about 1,000 feet wide by 1,500 feet long and 35 feet deep, and for an entrance channel 500 feet wide by 35 feet deep. All new work under the project was completed in 1935, at a total cost of $880,000, of which $680,000 was from Federal funds and $200,000 was contributed by local interests. The total cost to the Federal Government to June 30, 1939, was $692,243.53, of which $680,000 was for new work and $12,243.53 was for maintenance. The estimated annual cost of maintenance, approved in 1933, is $15,000. Experience since completion of the projects indicates the adequacy of this amount for maintenance.

14. *Local cooperation.*—Under the conditions of authorization of the project, local interests furnished cooperation as follows: Contributed $200,000 toward the first cost of the work; deeded to the United States an area of 0.418 acre containing the privately constructed breakwater and a small reservation at the shore end thereof; granted to the United States, for breakwater construction and maintenance purposes, a perpetual easement to an area of 1.75 acres adjoining the breakwater reservation area; granted to the United States a perpetual easement to all quarry rights for breakwater-maintenance purposes in a quarry area of 12.59 acres, located about a mile east of the breakwater; and granted to the United States a perpetual right-of-way between the breakwater and the quarry area.

15. *Other improvements.*—In addition to the local cooperation noted above, local interests have performed other work to improve the navigability of the harbor and in providing terminal improvements as follows:

(*a*) Prior to adoption of the Federal project, constructed a rubble mound breakwater 230 feet long for protection of landings against ocean storms and swells. This breakwater is now the property of the United States and forms an integral part of the breakwater, the extension of which was constructed by the Federal Government.

(*b*) Prior to adoption of the Federal project, constructed a small concrete wall and stone fill near the end of the sugar-loading pier for protection against wave action within the bay. Because of the greater protection now afforded by the Federal Government breakwater, this structure is no longer needed for the purpose for which it was built.

(*c*) Assisted by a Public Works Administration grant of $365,000 made in 1938, constructed a concrete wharf shed, conveyors, and other terminal facilities, and dredged 2 slips approximately 300 feet wide by 500 feet long and 35 feet deep.

(*d*) Provided a system of moorings and a harbor tug to assist ships in mooring, docking, and turning within the basin.

The approximate cost of the improvements provided by local interests, including the Public Works Administration grant of $365,000 made in 1938 is estimated as follows:

Rubble mound breakwater, concrete wall, and stone fill	$23,000
Wharf, shed, conveyors	660,000
Dredged slips	165,000
Ship moorings	16,000
Harbor tugboat	37,000
Total	901,000

16. *Terminal facilities.*—Port Allen Harbor possesses, at the present time, one publicly owned general freight pier. The existing pier, constructed in 1939 by the Territory of Hawaii, aided by a Public Works Administration grant, is of reinforced concrete, 124 feet wide by 600 feet long, with a steel terminal shed 34,300 square feet in area. It is provided with electrically operated conveyor systems for transporting sacked sugar from warehouses directly into ships' holds and with pipe lines for fuel oil and molasses. The pier is connected by rail with the track system of Kauai Terminal, Ltd., and by paved road with the highway system of the island.

17. In addition to the facilities named above, two sugar warehouses with a combined capacity of 25,000 tons and a general freight warehouse with an area of 28,000 square feet, have been constructed by private interests. Seven steel tanks for the storage of fuel oil, gasoline, and molasses, together with the necessary pipe lines for connection to the pier facilities, are also owned and operated by private interests. The belt-line railway owned by Kauai Terminal, Ltd., and connecting to the Territorial pier, serves the warehouses and storage yards, and connects to other lines serving the sugar mills and plantations of the island.

18. The existing terminal and transfer facilities provided by local interests to supplement the Federal project are believed adequate for all needs of present and prospective commerce.

19. *Improvement desired.*—A public hearing was held at Hanapepe, Kauai, on May 26, 1939, prior to submission of the report on preliminary examination, for the purpose of considering further improvements to Port Allen Harbor. A transcript [1] of the public hearing was transmitted as an enclosure to the report on preliminary examination submitted to the division engineer on June 28, 1939. Represented at the hearing were the Kauai Terminal, Ltd., navigation companies,

[1] Not printed.

shipmasters, local civic groups, the Territorial Board of Harbor Commissioners, other local government agencies, and shipping interests and individuals. At that time requests were made as follows:

(*a*) Widening of the harbor basin by dredging a strip varying in width from about 130 feet to 170 feet along its northerly side, to provide turning room for vessels maneuvering from the Territorial pier.

(*b*) Consideration of the need for a silting basin north of the harbor basin, to prevent shoaling of the slips and basin by sediment during freshets in the Hanapepe River.

(*c*) Consideration of the construction of groins, or other appropriate works, to extend from shore on the north side of Hanapepe Bay, to prevent the formation of a sand bar across the mouth of the Hanapepe River, and deflect the flow of the river away from the pier area.

No definite request relative to construction of an additional breakwater at the west side of the entrance channel was made at that time, but its desirability was discussed by various private interests.

20. Following the authorization of a survey of the harbor, conferences were held with local interests for the purpose of obtaining further statements concerning the desired widening of the harbor basin. Copies of the statements received are attached to this report (exhibits A to D).[1] All interests concurred in the contention that enlargement of the harbor basin on its northerly side was necessary for safe navigation within the harbor and requested that the minimum improvement should provide for an additional width of not less than 200 feet outside of the present Federal project boundary on the northerly side of the harbor.

21. The request for widening of the harbon basin was based upon the experience gained in the operation of vessels therein during the 5-month period subsequent to completion of the new Territorial pier. Shipping interests state that the present width of the basin is inadequate for the safe maneuvering of vessels from the pier. A description of the difficulties encountered is provided in paragraphs 26 and 27 of this report.

22. *Commerce, past and present.*—Slightly more than one-half of the total ocean-going commerce to and from the island of Kauai passes through Port Allen Harbor. Outgoing shipments consist chiefly of raw sugar, molasses, and canned pineapples; receipts consist of fertilizer, lumber, petroleum products, and miscellaneous freight. Commerce through the port during the past 10 years has averaged about 220,000 tons per year with an estimated value of about $12,650,000 per year. A statement of the commerce by years is given in the following table:

Year	Tonnage	Value	Passengers	Year	Tonnage	Value	Passengers
1930	213, 580	$13, 285, 836	-------	1935	219, 236	$11, 439, 186	11
1931	207, 906	12, 657, 127	185	1936	246, 402	15, 032, 222	-------
1932	203, 031	10, 663, 258	75	1937	235, 337	14, 638, 577	-------
1933	206, 138	12, 073, 298	70	1938	220, 003	12, 067, 704	-------
1934	216, 443	11, 991, 550	21	1939	229, 165	[1]	89

[1] Not available.

23. The nature of the freight traffic through Port Allen Harbor is represented by the following tabulation of the principal classes of commodities for the year 1939:

Freight traffic, 1939

	Tons
A. Coastwise (from United States):	
1. Receipts:	
Lumber	8,732
Tin plate	906
Fertilizer	3,397
Miscellaneous	36,641
2. Shipments:	
Canned pineapple	12,439
Raw sugar	111,968
Molasses, unrefined	34,667
Miscellaneous	1,287
3. Total United States	209,037
B. Interisland:	
1. Receipts:	
Lumber	54
Fertilizer	7,520
Miscellaneous	11,280
2. Shipments:	
Canned pineapple	25
Miscellaneous	1,249
3. Total interisland	20,128
C. Total of all freight	229,165

24. *Commerce, prospective.*—The area tributary to Port Allen Harbor is fixed by the topography of the island and is almost entirely agricultural in character. Practically all areas susceptible to profitable cultivation are already developed, and it thus appears that any material increase in the tonnage passing through the port can result only from improved methods of cultivation which will increase the yield per acre, from development of industries utilizing waste products of sugarcane and pineapple, and from a natural increase in population and the volume of small business. In view of the above the average annual commerce may be expected to increase slowly during the next few years, and the present trend indicates that an average annual volume of about 240,000 tons may be reached by 1945. The volume of commerce would not be affected by the improvement requested by local interests, nor is it likely that freight rates would be materially reduced thereby. The improvement would have no effect upon the use of the harbor by seasonal passenger craft, yachts, fishing boats, or similar watercraft.

25. *Vessel traffic.*—The number and draft of vessels calling at Port Allen has remained nearly constant during the past 5 years. The total number of vessels entering the harbor during a year is about 150, of which about 100 are trans-Pacific ships and about 50 are interisland vessels. Trans-Pacific ships using the port are freighters and tankers having lengths up to 546 feet and drafts up to 31.5 feet. The interisland vessels are combination freight and passenger ships, having lengths up to about 310 feet and drafts up to 17.5 feet. Ships of the Inter-Island Steam Navigation Co. make Port Allen a weekly port of

call, and the yearly number of calls by interisland vessels is unlikely to decrease. It is also unlikely that the total number of calls by all vessels will increase materially unless an unexpected increase in tonnage through the port is experienced. The nature of vessel traffic through the harbor is represented by the following tabulation for the year 1939:

Departures from Port Allen Harbor, 1939

Draft in feet	Number of vessels		
	Trans-Pacific	Interisland	Total
28 to 30 feet	9		9
26 to 28 feet	5		5
24 to 26 feet	12		12
22 to 24 feet	23		23
20 to 22 feet	16		16
18 to 20 feet	22		22
Under 18 feet	11	51	62
Total vessels	98	51	149
Total net registered tonnage	402,787	51,706	454,493

26. *Difficulties attending navigation.*—Prior to October 1939, difficulties attending navigation were largely due to the lack of a suitable pier. Ships entering the harbor were secured to mooring buoys located within the harbor basin and unloaded and loaded by means of lighters operating to and from the shore. In October 1939, construction of the new Territorial pier at the east end of the harbor was completed, and operation of vessels thereto was begun. Since that time, shipping companies and other interested agencies have reported that considerable difficulty has often been encountered by vessels maneuvering within the harbor basin. During calm weather, ships can back from the pier and, with the aid of a tug, maneuver into a position to proceed from the harbor. At times of high winds, however, departure from the harbor is accomplished with much difficulty and frequently with considerable danger. The difficulty is most pronounced when winds blow from the south or southwest—a frequent occurrence during the winter months. The trans-Pacific ships which commonly call at this port are mostly single-screw vessels about 500 feet in length, the minimum backing radius of which, when unaided by a tug, is reported to be three times the length, or about 1,500 feet. The length of arc in the present harbor basin, available to ships in backing from the south slip is about 1,200 feet, or slightly greater than twice the length of the larger vessels using this slip. Shipping interests claim that the width of the basin is too small to permit vessels to keep sternway until a position has been reached for heading out of the harbor past the end of the breakwater, even when aided by the harbor tug. In quiet weather the vessel is stopped, after backing a reasonably safe distance into the turning basin, until the tug has pulled the bow about to head toward the harbor entrance. During stormy weather, however, this procedure becomes dangerous, for the vessel, when stopped and swung with the wind abeam for any time, will quickly drift. Dependent upon the direction and force of the wind, the vessel may be driven upon the pier or upon the banks of the harbor basin.

27. The danger described above is exemplified by the experience on the night of January 4, 1940, of the steamship *Makiki*, a single-screw vessel 416 feet long, operated by the Matson Navigation Co. A wind, with velocity of about 30 miles per hour, was blowing from the southwest when the vessel attempted to depart from the harbor. In backing away from her berth at the southeast side of the pier, the ship succeeded in making half of her turn until she lay perpendicular to the center line of the dock and several hundred feet away. She was unable to continue her turning movement astern, owing to the proximity of the north bank of the basin; and rough water at that point within the harbor rendered the tugboat helpless to pull her bow around. As a result, the vessel was blown back across the harbor onto the end of the dock, cracking the concrete structure and bending side plates on the ship. The harbor master of the Kauai Terminal, Ltd., who witnessed the accident, reported that only skilled handling on the part of the master of the *Makiki* prevented her from being driven aground or striking the pier in such a manner as to result in very serious damage.

28. *Survey.*—The field survey conducted in connection with the preparation of this report consisted primarily of a hydrographic survey of Port Allen Harbor and was completed in March 1940. This survey, in conjunction with test borings made in 1933, provided information adequate for preparation of the necessary maps and cost estimates relative to the plan of improvement. The results of the hydrographic survey, together with the log and the location of the borings, are shown on the map accompanying this report.

29. *Plan of improvement.*—The plan of improvement contemplated is the minimum improvement requested by local interests. It provides for dredging outside of the existing Federal project, to a depth of 35 feet below mean lower low water, an area about 200 feet wide extending approximately 1,200 feet along the northerly side of the harbor basin. The location of the area is shown on the map accompanying this report. The estimated cost of the improvement, based on borings made in 1933 and dredging of the present project, is as follows:

(*a*) Dredging 173,000 cubic yards of sand, shell, and mud, at 40 cents per cubic yard	$69,200
(*b*) District, division, and Chief of Engineers overhead, 8 percent of $69,200	5,500
(*c*) Total cost	74,700

30. *Discussion.*—The experience of shipmasters and the observations of others concerned with navigation in Port Allen Harbor appear to have definitely shown that operation of vessels of the larger class, and especially those with single screws, from the Territorial pier during conditions of strong southerly or southwesterly winds is both difficult and hazardous. The majority of trans-Pacific ships which call at Port Allen are single screw. It is estimated that the total number of calls made by this type during any year is in excess of 80. About one-half of these calls, or 40 per year, are estimated to be made during the fall and winter months when southern storms are apt to occur. The accident occurring to the single-screw vessel *Makiki*, length 416 feet, is evidence of the dangers associated with the maneuvering of this class of vessel in the present harbor basin under such conditions.

Although the actual physical damage which resulted in this accident was not great, it is believed that slightly different circumstances might have resulted in very serious consequences. A number of single-screw vessels larger than the *Makiki* operate regularly from Port Allen Harbor. The difficulties and hazards associated with the maneuvering of these larger vessels within the harbor basin during southerly storms would be greater than those contributing to the accident of the *Makiki*.

31. Provision of the additional width of turning basin should provide sufficient additional backing area for a vessel maneuvering from the pier to permit the bow to be brought about into position for heading out past the end of the breakwater without the necessity of the vessel lying without sternway or headway a dangerous interval of time while being pulled about by the harbor tug.

32. Remedying the present difficulty by relocation of the existing pier is impracticable, owing not only to the large investments embodied in terminal facilities on the eastern end of Hanapepe Bay but also to the lack of a satisfactory pier location in any other portion of the bay. Construction of a west breakwater at the harbor entrance would benefit navigation considerably by providing relatively quiet water within the harbor during all conditions of weather. It would also probably reduce the erosion which is progressing rapidly in the northwest portion of Hanapepe Bay and would tend to retard the formation of the sand bar across the mouth of the Hanapepe River, thus probably reducing to some extent the silting of the pier slips and harbor basin. Such a breakwater, however, would be expensive and, even though constructed, would not remove the need of the additional basin width. Construction of such a breakwater is not believed to be warranted at this time. The construction of groins is not believed pertinent to the needs of navigation, and the benefits of a silting basin can be achieved more readily through maintenance dredging.

33. Economic evaluation of the benefits which would result from the requested dredging is not possible. The tangible or intangible losses, which might be sustained by navigation during a future period of years in the event no improvement is made, can in no way be predicted. However, it is believed that the experience of ship operators has clearly established that the harbor in its present condition is inadequate to permit the maneuvering of vessels therein with reasonable safety during periods of high winds, and that it therefore does not properly nor adequately fulfill the purpose for which it was constructed. The request by local interests for an increase in harbor width of 200 feet appears to constitute a reasonable minimum improvement which can meet the needs of immediate and reasonably prospective future commerce. It is not believed that further local cooperation should be required.

34. *Shore-line changes.*—Shore erosion in Hanapepe Bay will probably present a relatively serious problem in ensuing years. Since completion of the Federal breakwater on the east side of Hanapepe Bay in 1935, the normal clockwise current within the bay and the accompanying erosion appear to have been accentuated and the steep banks comprising the northwest shore line have been cut back a dis-

tance of about 140 feet, as shown on the map accompanying this report. In March 1940 erosion had proceeded to within 5 feet of the paved road leading to the Territorial airport and no evidence exists to indicate that stabilization of the shore line may be expected for years to come. This erosion has a definite effect upon the harbor, in that the materials eroded are deposited by the current near the mouth of the Hanapepe River and thence carried by freshets into the harbor basin and slips. The proposed plan of dredging, however, will neither contribute to, nor retard, this shore-line erosion.

35. *Water power.*—The desired improvement cannot be coordinated with any possible plan for the development of water power.

36. *Land reclamation.*—Reclamation of land in connection with the desired improvement constitutes a remote possibility. A low-lying tract containing approximately 100 acres, and situated on the east side of the Hanapepe River immediately to the north of Port Allen is at present so swampy and poorly drained that the Territory of Hawaii has condemned it as a residential section. If the material from the harbor basin were pumped into this low-lying area to an elevation to prevent flooding from the Hanapepe River, a portion thereof could be made available for satisfactory home sites. However, the present need for additional building sites in this locality is so small that it is believed the amount of benefits which might be secured thereby would be insufficient to offset the additional cost required to pump the material into the area. Likewise, a low-lying area in the vicinity of the airport under the control of the War Department could be filled, with resulting benefit to the Air Corps. However, it is believed the benefits which might accrue therefrom would also be insufficient to offset the additional cost required to pump the material into this area.

37. *Conclusions.*—The district engineer concludes that the request by local interests for additional dredging in Port Allen Harbor to provide an additional width of 200 feet in the harbor basin constitutes a reasonable minimum improvement which can meet the needs of immediate and reasonably prospective future commerce. Although economic evaluation of the benefits which would result from the improvement is not possible, he believes that the improvement is clearly justified in the interest of safety and convenience of established navigation.

38. *Recommendations.*—The district engineer recommends that the existing project for Port Allen Harbor be modified by dredging an area about 200 feet wide by about 1,200 feet long, approximately as shown on the map accompanying this report, at the northerly side of the existing project to a depth of 35 feet, at an estimated first cost of $74,700, with an estimated annual maintenance of $3,000, which is in addition to the present approved amount of $15,000 for annual maintenance of the existing project.

P. E. Bermel,
Major, Corps of Engineers,
District Engineer.

[First endorsement]

OFFICE, DIVISION ENGINEER,
SOUTH PACIFIC DIVISION,
San Francisco, June 10, 1940.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The division engineer finds that the commerce of Port Allen is being steadily maintained in an amount greater than that which was originally estimated to justify the improvement, and that indications are that there will be a slow increase of commerce up to an expected total of about 240,000 tons per annum in 1945.

2. He further finds that while the number of vessels using the harbor is moderate, generally 150 per annum, all of the vessels are ocean-going craft ranging from interisland vessels of about 310-foot length and 17½-foot draft to trans-Pacific freighters up to 546 feet in length with drafts of 31½ feet. The latter vessels at the present time have difficulty in maneuvering to and from the new Territorial pier during periods of high winds even with tug assistance, and one collision between a freighter and the pier has already occurred with damage to both.

3. The present handicap to full and safe utilization of Port Allen Harbor can be eliminated by a moderate enlargement of the harbor basin in a general northwesterly direction and, in the opinion of the division engineer, this improvement is warranted in the general interest of removing hazards and delays to navigation.

The division engineer concurs in the views of the district engineer that any improvement other than that discussed above is not considered necessary or justifiable at this time.

4. The division engineer recommends that the existing project for Port Allen Harbor be modified to provide for dredging an area at the northerly side of the existing project about 200 feet wide, 1,200 feet long, and 35 feet deep, approximately as shown on the map accompanying the district engineer's report, at an estimated cost of $74,700 for new work with $3,000 annually for maintenance in addition to the approved estimated annual maintenance for the harbor.

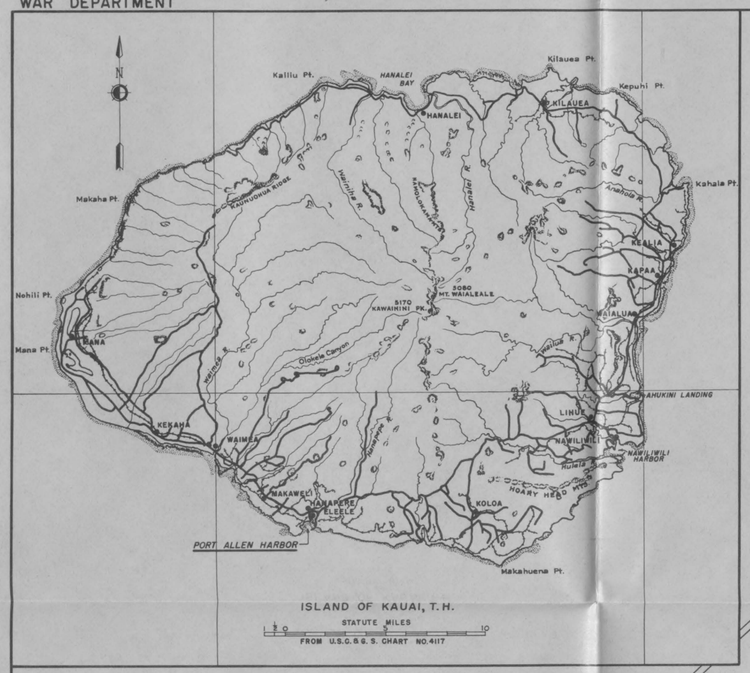
It is further recommended that the entire amount of $74,700 be made in one allotment.

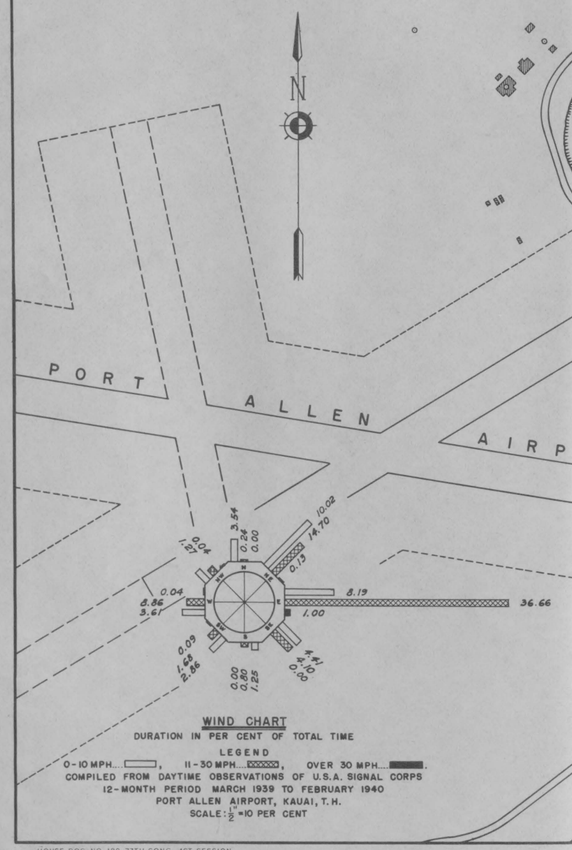
WARREN T. HANNUM,
Colonel, Corps of Engineers,
Division Engineer.

( )

WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY





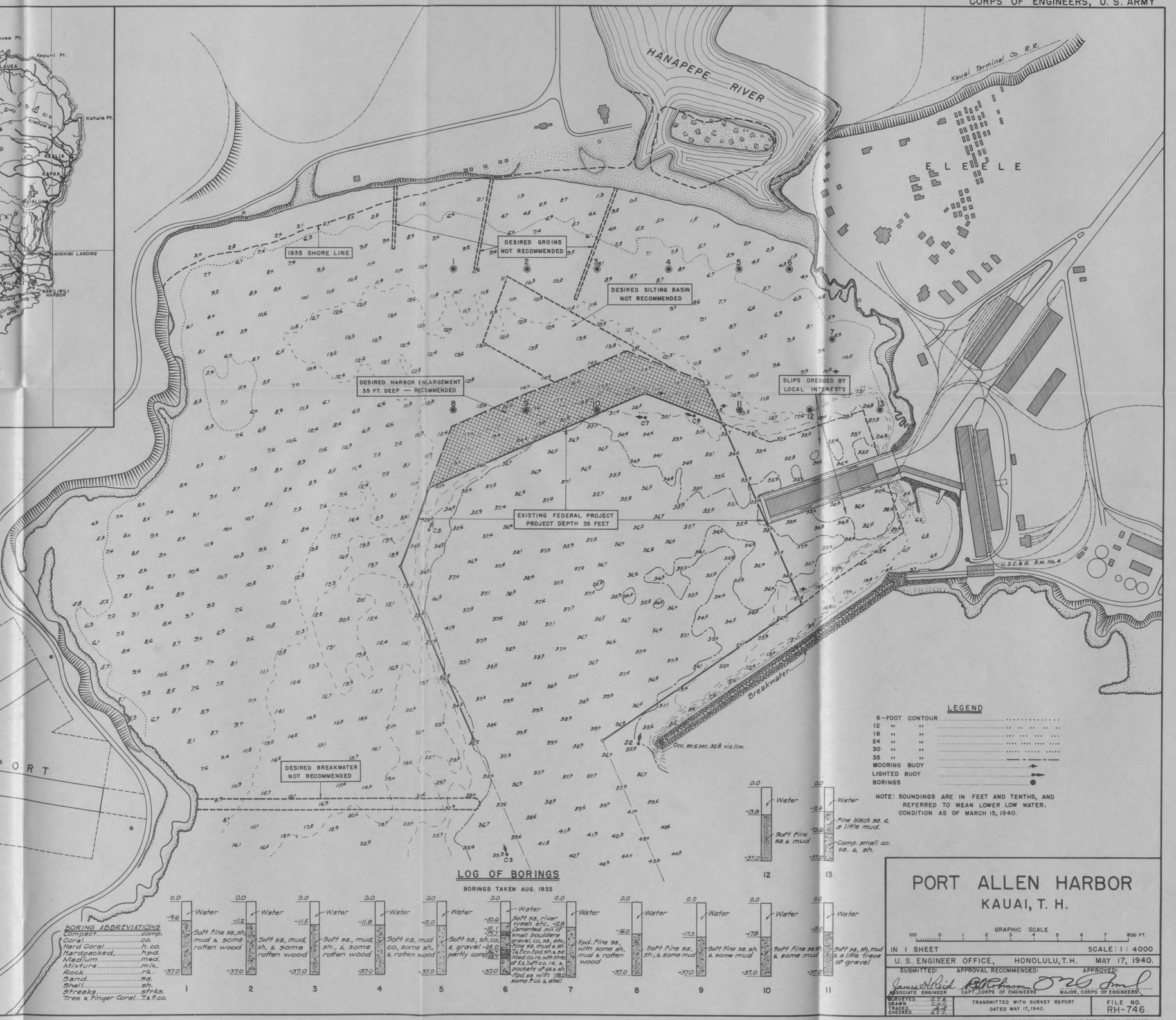
WIND CHART

DURATION IN PER CENT OF TOTAL TIME

LEGEND

0-10 MPH..... , 11-30 MPH..... , OVER 30 MPH..... .

COMPILED FROM DAYTIME OBSERVATIONS OF U.S.A. SIGNAL CORPS
12-MONTH PERIOD MARCH 1939 TO FEBRUARY 1940
PORT ALLEN AIRPORT, KAUAI, T.H.
SCALE: ½ = 10 PER CENT



LEGEND

6-FOOT CONTOUR.....
12 " "
18 " "
24 " "
30 " "
35 " "
MOORING BUOY
LIGHTED BUOY
BORINGS

NOTE: SOUNDINGS ARE IN FEET AND TENTHS, AND REFERRED TO MEAN LOWER LOW WATER. CONDITION AS OF MARCH 15, 1940.

LOG OF BORINGS

BORINGS TAKEN AUG. 1933

BORING ABBREVIATIONS

Compact	comp.
Coral	co.
Hard Coral	h. co.
Hardpacked	hpd.
Medium	med.
Mixture	mix.
Rock	rk.
Sand	sa.
Shell	sh.
Streaks	strks.
Tree & Finger Coral	T. & F. co.

PORT ALLEN HARBOR

KAUAI, T. H.

GRAPHIC SCALE 100 0 1 2 3 4 5 6 7 800 FT.

IN 1 SHEET — SCALE: 1: 4000

U. S. ENGINEER OFFICE, HONOLULU, T.H. — MAY 17, 1940.

SUBMITTED:	APPROVAL RECOMMENDED:	APPROVED:
James A. Reid	[illegible]	[illegible]
ASSOCIATE ENGINEER	CAPT., CORPS OF ENGINEERS	MAJOR, CORPS OF ENGINEERS

SURVEYED C.T.B.
DRAWN C.T.C.
TRACED C.T.C.
CHECKED C.T.C.

TRANSMITTED WITH SURVEY REPORT DATED MAY 17, 1940.

FILE NO. RH-746

HOUSE DOC. NO. 180, 77TH CONG., 1ST SESSION

U. S. GOVERNMENT PRINTING OFFICE: 1941—O-312071